

METHOD OF FORMING STRAINED SILICON MATERIALS WITH IMPROVED THERMAL CONDUCTIVITY

Abstract

A method is disclosed for forming a strained Si layer on SiGe, where the SiGe layer has improved thermal conductivity. A first layer of Si or Ge is deposited on a substrate in a first depositing step; a second layer of the other element is deposited on the first layer in a second depositing step; and the first and second depositing steps are repeated so as to form a combined SiGe layer having a plurality of Si layers and a plurality of Ge layers. The respective thicknesses of the Si layers and Ge layers are in accordance with a desired composition ratio of the combined SiGe layer (so that a 1:1 ratio typically is realized with Si and Ge layers each about 10 Å thick). The combined SiGe layer is characterized as a digital alloy of Si and Ge having a thermal conductivity greater than that of a random alloy of Si and Ge. This method may further include the step of depositing a Si layer on the combined SiGe layer; the combined SiGe layer is characterized as a relaxed SiGe layer, and the Si layer is a strained Si layer. For still greater ther-

mal conductivity in the SiGe layer, the first layer and second layer may be deposited so that each layer consists essentially of a single isotope.